DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, APRIL-2020

ENGINEERING MATHEMATICS -II

[Maximum marks: 75]   (Time: 2.15 Hours)

PART – A
(Answer any *three* questions in one or two sentences. Each question carries 2 marks)

I. (1). Define a vector quantity and give an example of a vector quantity.

(2). State binomial theorem for a positive integer.

(3). Define transpose of a matrix.

(4). Evaluate $\int x^2$ dx.

(5). Find the degree and order of the differential equation: $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 3y = 0$ (3 x 2 = 6)

PART – B
(Answer any *four* of the following questions. Each question carries 6 marks)

II. (1). Find the middle term of $(2x - \frac{3}{x})^9$

(2). Solve using Cramer's rule, given 2x+3y+z = 11, 2x-y+4z = 13, 3x+4y-5z = 3

(3). If A = $\begin{pmatrix} 3 & 1 & 2 \\ -1 & 2 & 3 \\ 2 & -5 & 7 \end{pmatrix}$ and B = $\begin{pmatrix} -2 & 4 & 1 \\ 3 & -1 & 2 \\ 4 & 1 & 3 \end{pmatrix}$ be two matrices. Compute AB and BA.

(4). Find $\int x^2$ sinx dx.

(5). Evaluate $\int_0^{\frac{\pi}{2}} cos\, 4x\, cosx\, dx$

(6). Find the volume of the solid generated by revolving one arch of the curve y = 3 sin2x

about the X-axis.

(7). Solve $\frac{d^2y}{dx^2} = $ cosx.   (4 x 6= 24)

PART – C

(Answer *any of the three units* from the following. Each question carries 15 marks)

UNIT –I

III. (a). Find the unit vector perpendicular to the vectors 5i-2j+4k and i+3j+2k. (5)

(b). Find the work done in moving an object from A with position vector 2i-6j+7k to the point B with position vector 3i-j+5k by a force i+3j-k. (5)

(c). Find the moment of the force about the point whose position vector is 2i+j-k where the force is given by 4i+k acting through the point i-j+2k. (5)

OR

IV. (a). Expand $(x-\frac{1}{x})^6$ (5)

(b). Find the coefficient of x^{12} in the expansion of $(x^2+\frac{1}{x^2})^{10}$ (5)

(c). Find the constant term in the expansion of $(2\sqrt{x}-\frac{1}{x^2})^{10}$ (5)

UNIT-II

V. (a). Solve for x, if $\begin{vmatrix} x & 2x & x \\ x & 3x & 3 \\ 1 & 2 & 2 \end{vmatrix} = 0$ (5)

(b). Solve $\frac{2}{x}+\frac{3}{y} = 5$

$\frac{2}{x}+\frac{5}{y} = 3$ (5)

(c). If $A\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$, $B=\begin{pmatrix} 7 & 8 & 9 \\ 10 & 11 & 12 \end{pmatrix}$, find $5A - 2B$. (5)

OR

VI. (a). Find the inverse of the matrix $A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 5 & 0 \\ 2 & 4 & 3 \end{pmatrix}$ (5)

(b). Express the matrix $A\begin{pmatrix} 2 & 0 & 0 \\ 2 & 1 & 0 \\ 2 & 1 & 1 \end{pmatrix}$ as the sum of a symmetric and a skew symmetric matrices. (5)

(c). If $A =\begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix}$, $B =\begin{pmatrix} 2 & 0 \\ 0 & -2 \end{pmatrix}$, prove that $A^2 = B^2$ (5)

UNIT-III

VII. (a). Evaluate (i). $\int x\sqrt{x}dx$.   (ii). $\int tan^2 xdx$ (5)

    (b). Prove that (i). $\int cotxdx = \log(\sin x) + c$.   (ii). $\int \dfrac{1}{xlogx} dx = \log(\log x) + c$ (5)

    (c). Evaluate $\int cosecxdx$.   (5)

OR

VIII. (a). Evaluate $\int x^2 e^x dx$.   (5)

    (b). $\int_0^{\frac{\pi}{2}} \sqrt{(1 + \sin x)}\, dx$ (5)

    (c). Evaluate $\int e^{\,tanx} \sec^2 x\, dx$ (5)

UNIT-IV

IX. (a). Find the area included between one arch of the curve y = sinx and the X-axis.   (5)

    (b). Find the area of a circle of radius a using integration.   (5)

    (c). Find the volume of a right circular cone of radius r and height h using integration.   (5)

OR

X. (a). Solve $\dfrac{dy}{dx}$ +y tanx = secx.   (5)

    (b). Solve $\dfrac{dy}{dx} = \dfrac{xy^2 + x}{yx^2 + y}$ (5)

    (c). Solve $\dfrac{d^2y}{dx^2} = xe^x + \sin x$.   (5)